

A GYNANDROMORPHIC SPECIMEN OF TRIGONA CUPIRA VAR. RHUMLERI (FRIESE)

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Up to 1913 gynandromorphic individuals had been reported, according to Enderlein,¹ in the case of 78 species of Hymenoptera. Of these, 38 were bees, distributed among the following genera: *Apis*, *Bombus*, *Trachusa*, *Megachile*, *Chalicodoma*, *Osmia*, *Nomada*, *Anthophora*, *Tetralonia*, *Eucera*, *Xylocopa*, *Macropis*, *Andrena*, *Halictus*, *Sphcodes*, and *Hylæus*. In a notable recent contribution to the subject of sex anomalies among the *Apoidea*, Professor Mitchell² summarizes the additional instances reported in the decade and a half elapsed since the appearance of Enderlein's paper. Only one genus of bees (*Dianthidium*)³ has been added in that interval to the number represented by gynandromorphs or intersexes, all of the other eleven examples falling within the genera above listed. Although sexual abnormalities had been made known in the case of only five species of *Megachile* (including the subgenus *Chalicodoma*) up to the time when Professor Mitchell issued his paper, his own researches resulted in the discovery of a number of additional instances, assignable to eleven different species.

In view of the relative rarity of these phenomena, it seems worth while to record an instance in a genus and family of bees for which, so far as I have been able to ascertain, no case of gynandromorphism has hitherto been reported. I have recently been going over large series of the stingless bees of the tropics

¹ "Ein hervorragender Zwitter von *Xylocopa mendozana* aus Argentinien." By Dr. Günther Enderlein. Stettiner Entomologische Zeitung, 1913, LXXIV, pp. 124-140.

² "Sex anomalies in the genus *Megachile*, with descriptions of new species." By Theodore Bertis Mitchell. Transactions of the American Entomological Society, 1929, LIV, pp. 321-383.

³ "A gynandromorphic bee of the genus *Dianthidium*." By C. H. Hicks. American Naturalist, 1926, LX, pp. 199-200.—"North American *Dianthidium*, *Anthidiellum* and *Paranthidium*." By Herbert F. Schwarz, American Museum Novitates, Oct. 9, 1926, No. 226, p. 11.

(Meliponidæ) and among them have found an instance of a predominantly lateral gynandromorph. The specimen is one of a large series, numbering about 400, that was taken by Professor J. C. Bradley on June 26, 1920, at El Campamiento, Colony of the Perené, Peru, at an elevation of 2,500 feet. Through the kindness of Professor William T. M. Forbes, who accompanied Professor Bradley on this expedition of Cornell University, I have learned that the bees had established themselves in a large but low earth nest of termites (*Nasutitermes*). I have identified the colony of bees as that of *Trigona cupira* var. *rhumbleri* (Friese).⁴

To enable the reader to visualize to some extent the peculiar effect produced by an individual in which the male and worker characters are divided almost equally so far as the head and thorax are concerned—one lateral half of these parts being mostly worker, the other lateral half exclusively male—it is desirable to point out the sexual dimorphism within the *cupira* group.

Of the tabulated characters the abnormal specimen here discussed has on the left half of its body those described for the male under 1, 2, 3, 4, 5, 6, 7, 8, 9 and on the right side of its body those described for the worker under 1, 2, 3, 4, 5, 6, 7. As to character

⁴ Smith's *cupira* is here considered the type species for the group with deeply concave, spoonlike third tibiæ rather than Latreille's *pallida*, which, in accord with Professor Cockerell, I interpret as the equivalent of Friese's *kohli*, an insect of quite different structure.

This adaptable species builds, according to Ducke (1925), who gives a summary of its nest habits: "Usually in hollow trees or in the nests of termite species erected on trees; Silvestri found in Matto Grosso all three subspecies also in hollows in the earth and in the crevices of walls; in the states of São Paulo, Rio de Janeiro, and in adjacent regions the dark form (subspecies *cupira*) builds frequently an unenclosed nest between epiphytic Bromeliaceæ or on the outside walls of village dwellings (Ihering, 1903, J. Marianno). . . . These unenclosed nests of *pallida cupira* have until now been observed only in the southern parts of Brazil, but are of much rarer occurrence in the State of São Paulo than are those constructed in hollow trees. As tenants in the nests of tree-inhabiting termites the species is (in all its subspecies) of frequent occurrence in Amazonia, but it would seem only here." The presence of a colony of these bees in an earth nest of termites in Peru adds another interesting record to their biology.

Male

1. Mandibles short, not overlapping each other, broad at the base, very narrow and diagonally truncate at the apex, with a faint subtoothlike development at the inner edge of the apex.
2. Malar space short, a little more than linear.
3. Space separating eye from clypeus relatively narrow.
4. Scape short.
5. Flagellum with 12 joints.
6. The middle basitarsi a little narrower than in the worker.
7. The hind tibiae not so broad as in the worker, convex over most of their outer surface, with only a small concavity at the outer end of the apex. The outer surface thinly covered with scattered black hairs.
8. The hind basitarsi a little narrower and more nearly parallel-sided than in the worker.
9. All the tarsal claws cleft.

Worker

1. Mandibles long, greatly overlapping each other, broad at the apex, with two sharply defined teeth at the inner edge of the apex.
2. Malar space about twice as long as that of the male.
3. Space separating eye from clypeus relatively wide.
4. Scape long.
5. Flagellum with 11 joints.
6. The middle basitarsi a little wider than in the male.
7. The hind tibiae conspicuously broad and concave, hollowed out like a spoon. Long fringing hairs laterally, at most two or three longish hairs on the outer surface.
8. The hind basitarsi a little wider than in the male, and a little more abruptly narrowed toward the base.
9. All the tarsal claws simple.

No. 8 there is a little more doubt. The hind basitarsus on the left side of the body is that of the male, but the one on the right side, while broader than its fellow, is not so abruptly narrowed as is usual in the worker. It is at best, however, only slightly aberrant. The most subtle departure from what a superficial examination of the insect would pronounce a scrupulous lateral division into male and female characters reveals itself when the tarsal claws (9) are examined. Those on the left of the body (the male half) are all cleft, as is normally the case in the male. But those on the right of the body (the worker half) are by no means simple throughout, as is normally the case in the worker. Instead, the tarsal claws on the forelegs are cleft, those on the middle legs are simple, while those on the hind leg present the most interesting condition of all—the outer claw being cleft, the inner one simple. Finally it should be said that the partly extruded

genitalia of this specimen reveal themselves as those of the male.

While gynandromorphic individuals are usually a rarity, they have sometimes occurred in numbers, witness the famous hive of honey bees owned by Eugster of Constanz in the sixties of the last century. No less than 87 gynandromorphs from this hive were examined anatomically by v. Siebold⁵ (1864) and a residue, numbering 40 abnormal individuals, were studied by Mehling⁶ (1915). The bee considered in the present paper was, as already stated, accompanied by about 400 specimens, all taken from the same nest. I had hoped, therefore, upon discovering the gynandromorph to locate additional abnormal specimens among its fellows. But a reexamination of the approximately four hundred specimens, one by one, fails to reveal any abnormality whatever among them. What seemed at first an intersex character was noted in the case of the hind tibiae of the only two males found among the nest material. Figure G of the accompanying plate may serve to illustrate not only the hind leg on the left side of the gynandromorphic individual but also the hind leg of these two males, although, due to the fact that the drawing had to be made from an awkward angle, the outer edge of the apex of the tibia is sharper than appears to be the case when the leg lies flat. At any rate, the tibiae, as indicated in figure G, are rather exceptionally broad and their outer surface is rather strongly flattened to concave toward the apical extremity. The hind tibiae of other male specimens of *cupira* that have come to my attention—Panama, Feb. 28, 1915 (T. Hallinan), and Nov. 7, 1923 (F. E. Lutz), and Pto. America, Rio Putumayo, Brazil, Aug. 30–Sept. 2, 1920 (Cornell University Expedition)—have much narrower hind tibiae. However, that this broadening of the tibiae in the specimens from El Campamiento is to be interpreted not as a sexual abnormality but rather as a regional peculiarity is emphasized by the fact that other males from the Colony of the Perené—for instance a series from Pueblo Pardo, June 17, 1920 (Cornell

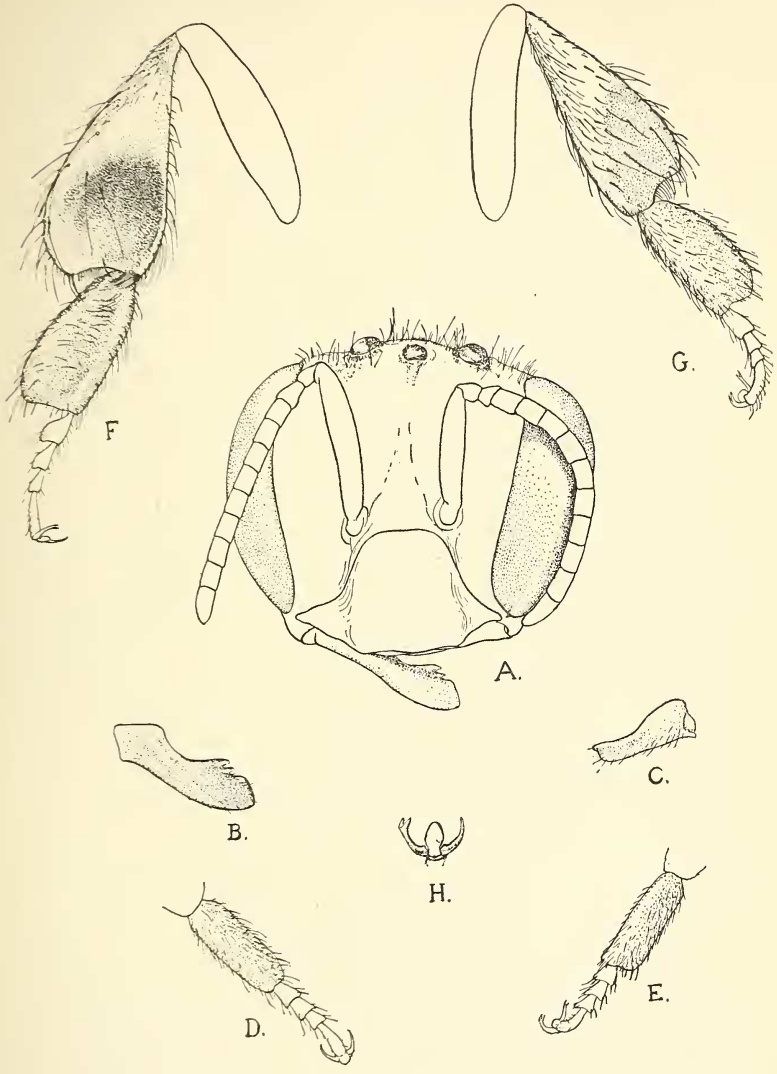
⁵ "Über Zwitterbienen." By C. Th. v. Siebold. Zeitschrift für wissenschaftl. Zool., 1864, XIV, pp. 73–80.

⁶ "Über die gynandromorphen Bienen des Eugsterschen Stockes." By Elsa Mehling. Verhandlungen der Physik.-Med. Gesellschaft zu Würzburg, 1915, XLIII, pp. 171–236.

University Expedition)—have tibiae as broad as those of the males from El Campamiento. That the Pueblo Pardo males represent a distinct nest is indicated not only by the different collecting locality (although both Pueblo Pardo and El Campamiento are at low level at the north end of the Chanchamayo Valley, I am informed by Professor William T. M. Forbes) but by the fact that these males have the dark coloration of typical *cupira* in contrast to the El Campamiento specimens, which align themselves in coloration with *rhumbleri*. Yet the structural peculiarity noted is evidenced in both. Friese's description of *rhumbleri* was based on the worker and embraced specimens of this cast from Peru as well as from Colombia and Brazil. In the interests of conservatism the gynandromorphic individual of this paper has been referred to *rhumbleri*, but it is open to doubt whether, in view of the characters noted in the male, it should not constitute a new variety.

A Gynandromorphic Individual of *Trigona cupira* var. *rhumbleri* (Friese)

Fig. A represents the head of the gynandromorphic individual, with the worker characters on the left side of the median line and the male characters on the right side. Note especially the disproportion in the length of the scapes; the presence of 12 segments in the worker antenna, of 13 in the male; the greater breadth of the male eye and its closer approach to the clypeus notwithstanding the fact that the lateral angles of the clypeus are on the male side of the face less attenuated and shorter than on the worker side; the longer malar space on the worker side and the less sloping character of the top of the head. The male mandible is concealed in Fig. A but is shown in Fig. C, contrasted with the worker mandible, also partly concealed in Fig. A but fully revealed in Fig. B. In Fig. D the slightly broader character of the basitarsus of the middle leg of the worker half of the gynandromorph compared with that of the male half (Fig. E) is indicated. Figs. F and G reveal the different character of the hind legs of this abnormal specimen, Fig. F representing the tibia and tarsal joints of the worker half and Fig. G the corresponding portions on the male half. A curious abnormality in the claws of the leg that is depicted in Fig. F is indicated in greater enlargement in Fig. H. Although in the main the leg represented in Fig. F has the character of the worker, its tarsal claws, as Fig. H indicates, are cleft on one side after the manner of the male, uncleft on the other side after the manner of the worker.



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